WE CLAIM:

1. A method for producing a three-dimensional model of a semiconductor chip from coarsely aligned mosaic images of respective layers of the semiconductor chip, the method comprising:

applying a line detection algorithm to each of the mosaic images to produce a set of line segments identified by x and y coordinates of ends of each line segment with respect to a frame defined by the mosaic image;

establishing virtual reference marks using end points of different mosaic images that are vertically aligned to within an uncertainty of the coarse alignment of the mosaic images;

using the virtual reference marks to adjust x and y coordinates of each of the mosaic images to derive a three dimensional coordinate space; and

processing the end points within the three dimensional coordinate space to define vias, lines and branch lines of the semiconductor chip, interconnected to define the three-dimensional model.

2. The method as claimed in claim 1 wherein applying the line detection algorithm comprises:

applying an edge detector to obtain an edge bitmap defining edge objects;

selecting pixel regions of edge objects that are likely to constitute segments of metal lines, given parameters of the semiconductor chip; and

applying a line tracing algorithm to each edge object to identify and store coordinates of corresponding line segments.

3. The method as claimed in claim 2 wherein applying the line tracing algorithm further comprises storing line segment coordinates in a hierarchical format with branch line segments nested with respect to previously identified line segments.

4. The method as claimed in claim 2 wherein applying an edge detector further comprises applying an algorithm that computes a difference between pixel values of neighboring pixels on opposite sides of a subject pixel to determine that the subject pixel is an edge transition pixel if the difference is above a predefined threshold.

5. The method as claimed in claim 4 wherein applying an edge detector further comprises applying an algorithm derived from at least one of Sobel, Prewitt, Roberts, and Hough transforms.

6. The method as claimed in claim 2 wherein applying the line tracing algorithm further comprises:

applying a line thinning procedure to pixels of the mosaic image bounded by the pixel regions of selected edge objects to produce a thinned line; and

defining the line segments by coordinate positions of the pixels at the ends of line segments, and storing the end point coordinates in a database.

7. The method as claimed in claim 6 wherein applying the line thinning procedure comprises iteratively setting pixel values of boundary pixels to a background pixel value, until the pixels that remain are bounded by background pixel values on two sides.

8. The method as claimed in claim 6 wherein applying the line thinning procedure comprises applying an algorithm derived from at least one of a Zhang Suen skeletonizing algorithm, and a Stentiford skeletonizing algorithm.

9. The method as claimed in claim 6 wherein applying the edge detection algorithm further comprises computing for each line segment a measure of uncertainty that the line segment constitutes a part of a metal line, using properties of the edge object, and properties of the thinned line given the die properties.

10. The method as claimed in claim 9 further comprising requesting an operator to examine the line segments with uncertainty measures above a predefined threshold.

11. The method as claimed in claim 1 wherein establishing virtual reference marks further comprises for each line segment end point on each mosaic image:

counting a number of other mosaic images that have coincident end points in a common projective x-y plane within an uncertainty of the coarse layer alignment;

identifying end points with a high coincidence in the x-y plane; and

selecting from the identified end points the virtual reference marks.

12. The method as claimed in claim 11 further comprising identifying a mosaic image having end points associated with a highest percentage of the virtual reference marks, and aligning each mosaic image to the identified mosaic image by adjusting x and y coordinates of each of the other mosaic images.

13. The method as claimed in claim 1 wherein processing the end points further comprises using predefined rules regarding configuration of the line segments to define lines and branch lines of the semiconductor chip.

14. The method as claimed in claim 1 further comprising displaying the 3-dimensional model to an operator, as a set of lines of predefined thickness.

15. The method as claimed in claim 14 wherein displaying further comprises permitting the user to view any one of the mosaic images alone, the mosaic images with the 3-D model overlayed, and 3-D model alone.

16. The method as claimed in claim 14 wherein displaying the 3-D model to the operator comprises permitting the operator to select any line, to create an annotation for a selected line; and to edit the connectivity of the line segments, and placements of vias.

17. The method as claimed in claim 14 wherein displaying the 3-D model to the operator comprises permitting

the operator to select a geometric area, and displaying a part of the 3-D model in the geometric area.

18. An article comprising a computer readable modulated carrier signal and means embedded in the carrier signal for executing the method of any of claims 1-17.

19. An article comprising a computer readable memory storing program instructions and means embedded in the memory for executing the method of any of claims 1-17.

20. An article comprising a computer readable modulated carrier signal for transmitting program instructions for executing the method of any of claims 1-17.